RWDI Australia Pty Ltd
ABN 86 641 303 871

MEMORANDUM

DATE:	February 12, 2021	**RWDI REFERENCE #:** 1904405
TO:	Anthony Witherdin	Director, Key Sites Assessments - DPIE
FROM:	Kevin Peddie	**Email:** kevin.peddie@rwdi.com
	Michael Pieterse	michael.pieterse@rwdi.com
RE:	**Solar Access – City of Sydney Review Response** **Waterloo Metro Quarter – Building 4**	

Dear Anthony,

It is understood that after submission of the planning documents for the Waterloo Metro Quarter Development, commentary has been provided on the submission. The comment received is noted below, with commentary in response discussed in this memo. This document is an addendum to the submitted Appendix OO – Solar Access report for Buildings 4.

City of Sydney Comments

Item 27 of the City of Sydney comments under the heading Amenity – social housing pertains to the Solar Access requirement of the Apartment Design Guide and noted the following:

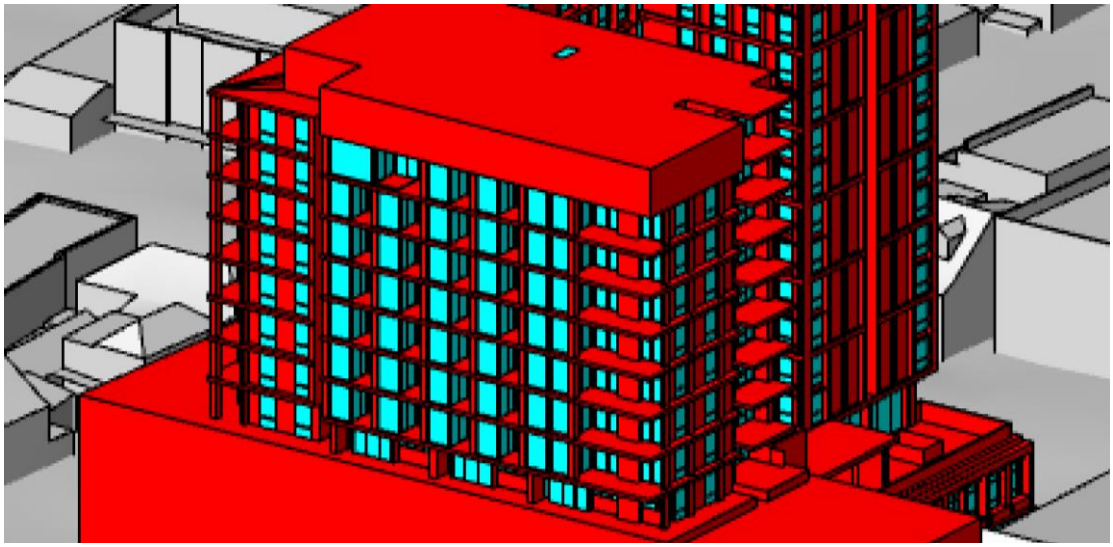
Solar access – The City notes that 15 of 70 apartments (21%) do not receive any direct solar access during mid-winter, four more than is permitted (15%) in accordance with Objective 4A-1 of the ADG. The City does not support the applicant's justification by including direct sunlight received after 3.00pm as this is not reflected in the design guidance or criteria and is of little thermal benefit due to the low altitude of the sun. Furthermore, some assertions regarding solar access are overstated, for example the quality of solar access to the living room of apartment 106 (the four-bedroom apartment). The analysis ignores the fixed vertical louvres to the east facing studios on Level 2 to 7 which block winter morning sunlight to living spaces. This removes 4 apartments per floor on levels 2-7 (24 apartments) and reduces the tally to well below 70%. This issue can easily be mitigated through a condition of consent requiring the fixed vertical blades to be changed to operable vertical blades. It should be noted that the Design Integrity Report records at item 4.03 that the supported privacy solution for these apartments is a "sliding privacy and sunscreen". This has now been removed from the scheme and further endorsement should be sought from the Panel.

RWDI Clarifications

The Solar Access study was undertaken by RWDI for the residential apartments associated with Building 4 of the development. Section 8 – Assessment and Findings, of the reports outlined the results of the modelling, noting the number of apartments which will have access to direct sunlight on June 21 between 9:00am and 3:00pm. The results provided an initial summary of the number of apartments which satisfied both direct sunlight to the living space as well as the private outdoor area, as well as a breakdown of each component. The assessment for the number of apartments which do not receive access to direct sunlight between 9:00am and 3:00pm for at least 15minutes is also detailed below.

Number of Apartments	Assessment Scenarios
73% (51 out of 70)	Apartments which receive at least 2hrs of sunlight access to the living space windows **AND** private outdoor areas between 9:00am and 3:00pm
21% (15 out of 70)	Apartments which receive at least 2hrs of sunlight access to the **living space windows**
11% (8 out of 70)	Apartments which receive at least 2hrs of sunlight access to the **private outdoor areas**

Concern is raised with regards to the ability for the 4 eastern apartments on Levels 2 to 7 to maintain solar access due to potential shading from the vertical louvres hence note that these apartments should not be considered. As can be noted from the below image, which depicts a view from the sun at 9:15am on June 21, the sunlight is not only on the eastern façade, but also on the northern aspect of the glazing for the living space areas on these levels. Hence irrespective of the design of the vertical louvres, the living space will maintain at least 2hrs of direct solar access to the living space and private outdoor areas.



View from the sun at 9:15am on June 21

The alternative design options considered by the architect have been addressed in a separate design addendum document prepared by the project architect.

Solar Irradiance

The City of Sydney noted concern that there is little thermal benefit in winter after 3:00pm due to the low altitude of the sun. A review has subsequently been undertaken of the available climate data to quantify council's concern.

The Bureau of Meteorology has a sparse network of ground stations which measure one minute statistics on a range of solar parameters including direct, diffuse and global solar radiance and terrestrial irradiance. A review of the one minute data has been undertaken for the winter period (May, June and July) at the closest ground station in terms of distance (Wagga Wagga), as well as the closest station in terms of latitude (Mildura) to the project site. The one minute data is presented as hourly steps, whereby each hour's value represents the mean of the mean of the one minute recording. A ground station with a similar latitude would provide the closest comparison to the project site.

The direct normal solar irradiation for the two sites is noted as follows. A linear interpolation could be used as a conservative assessment for the time intervals the times noted below (given that the solar irradiance level will have a logarithmic decay rate). For example, 3:30pm at the Mildura station (the closest equivalent to Sydney) the direct normal solar irradiance level would be approximately 83.5-88% of the direct solar irradiance level experienced at 3pm.

Station Location	Direct Normal Solar Irradiance (% variance)		
	3pm	3:30pm *(interpolated)*	4pm
Mildura *(Closest site in terms of latitude)*	100 %	83-88 %	67-76 %
Wagga Wagga *(Closest site in terms of distance – further south)*	100 %	71-79 %	43-59 %

The difference in solar irradiance levels between 3:00pm and 3:30pm highlights the marginal variance between this time step in the winter period. Further to this, the slightly lower angle of the sun at this period will provide greater solar penetration into the apartment instead of just at the glazing line. It is also expected that the daylight levels within the western facing apartments will be suitable given the exposed nature of the western aspect to the open sky. This is also aligned with the Objective 4A-2 of the ADG which notes that Daylight access is maximised where sunlight is limited.